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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,942	03/29/2006	Akinobu Sato	NAA237	5411

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Intellectual Property Law Office of David Lathrop
No. 827
39120 Argonaut Way
Fremont, CA 94538

EXAMINER	
BAND, MICHAEL A	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
07/08/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/573,942	SATO ET AL.	
	Examiner	Art Unit	
	MICHAEL BAND	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *9-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morimoto et al (USPGPub 2002/0000552) in view of Kools et al (USPGPub 2004/0137158).

With respect to claim 1, Morimoto et al discloses eliminating (i.e. smoothing) projections [100] via irradiation by ion beams [110] at an incident angle [Θ] of 60° to 90° to planarize a film surface [13] during a portion of time (abstract; p. 3, para 0050-0053; fig. 3B-C), where fig. 3C depicts the angle of said ion beams [110] with respect to the surface of said film surface [13] as $\Pi/2 - \Theta$, where Π equals 180 degrees. Therefore Morimoto et al teaches etching using the ion beams [110] between an angle of 0° to 30°, where the ion beams comprise Ar atoms (i.e. clusters) (p. 4, para 0072 and 0084). However Morimoto et al is limited in that while an Ar monomer beam is used, it is not suggested to smooth via cluster ion beam.

Kools et al teaches a method for preparing a surface of a substrate comprising a smoothing step by using a low energy noble (i.e. Ar) gas monomer or cluster ion beam,

where said cluster ion beam is Ar clusters (p. 4, para 0060-0062, 0067-0068). Kools et al depicts in fig. 6 the cluster ion beam smoothing the substrate at an acute angle.

Since the prior art of Kools et al recognizes the equivalency of an Ar monomer beam and Ar cluster ion beam in the field of angled smoothing of a substrate, it would have been obvious to one of ordinary skill in the art to replace the Ar monomer beam of Morimoto et al with the Ar cluster ion beam of Kools et al as it is merely the selection of functionally equivalent angled smoothing recognized in the art and one of ordinary skill would have a reasonable expectation of success in doing so. In addition since both Morimoto et al and Kools et al teach methods (i.e. monomer beam and cluster ion beam) for angled smoothing of a substrate, it would have been obvious to one of ordinary skill in the art to substitute one method for the other to achieve the smoothing of a substrate surface.

With respect to claim 2, modified Morimoto et al further discloses the etching rate of the ion beams increasing as the incident angle [Θ] increases from 0^{o} (i.e. 90^{o}) to reach the maximum when said incident angle is 60^{o} (p. 5, para 0089). The Examiner notes that while Morimoto et al states the maximum of Θ is 600^{o}, this is believed to be a typo and should read as 60^{o} since the maximum angle that would be used in this situation would be 360^{o}.

With respect to claim 3, modified Morimoto et al further disclose in fig. 7 a process of repeating a continuous change between the angle equal to or greater than 30^{o} and said angle of less than 30^{o}.

With respect to claims 4-6 and 8, modified Morimoto et al further discloses in fig. 5 the ion beams [110] irradiating at a plane of projection having an angle of the film surface [280] between 0^{o} and 30^{o} in a first direction, where said film surface [280] is capable of being rotated to a second direction different from said first direction in said plane of projection. Modified Morimoto et al also discloses that the angle for the first direction and second direction mutually is between 0^{o} and 30^{o} (abstract; p. 3, para 0050-0053; fig. 3B-C).

With respect to claim 7, modified Morimoto et al further discloses in fig. 3E depicts the film surface [13] as a convex portion having side walls.

Response to Arguments

103 Rejections

3. Applicant's arguments filed 6/23/2010 have been fully considered but they are not persuasive.

4. On p. 2-5, the Applicant argues that Kools et al does not teach use of gas cluster ion beams at acute angles and that monomer ion beams and gas cluster ion beams are equivalent.

The Examiner respectfully disagrees. Kools et al teaches in smoothing a surface of a substrate using a low energy noble (i.e. Ar) gas monomer or Ar gas cluster ion beam (para 0060-0062, 0067-0068), with Kools et al specifically stating that the smoothing step uses either a noble gas monomer or alternatively gas cluster ion beam (para 0060, 0068), thus gas monomer and gas cluster ion beam are equivalents. Fig. 6

depicts the smoothing step, where particles [208] for smoothing via gas monomer or gas cluster ion appear to be at an acute angle as indicted by the associated arrows (p. 2, para 0034; p. 3, para 0046; p. 4, para 0059 and 0070).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri, 9am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795